

**REMARKS**

Claims 1–20 are pending in the present application.

Claims 1 and 8 were amended to explicitly recite an inherent attribute of the claimed structure: that elimination of the stray or parasitic capacitances allows formation of a series resonant circuit by the SAW resonator and a variable tuning capacitor connected in series therewith, such that the tuning capacitor may be employed to selectively alter the resonant frequency. Claims 5 and 12 were amended to correct antecedent basis in light of the amendments to claims 1 and 8.

The specification was amended solely to supply a patent application serial number and patent number which were not available at the time of filing. No new matter has been added to the specification.

Reconsideration of the claims is respectfully requested.

**35 U.S.C. § 103 (Obviousness)**

Claims 1–10 and 12–20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,608,360 to *Driscoll*. This rejection is respectfully traversed.

In *ex parte* examination of patent applications, the Patent Office bears the burden of establishing a *prima facie* case of obviousness. MPEP § 2142; *In re Fritch*, 972 F.2d 1260, 1262, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992). The initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention is always upon the Patent Office. MPEP §

2142; *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (Fed. Cir. 1984). Only when a *prima facie* case of obviousness is established does the burden shift to the applicant to produce evidence of nonobviousness. MPEP § 2142; *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). If the Patent Office does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of a patent. *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Grabiak*, 769 F.2d 729, 733, 226 U.S.P.Q. 870, 873 (Fed. Cir. 1985).

A *prima facie* case of obviousness is established when the teachings of the prior art itself suggest the claimed subject matter to a person of ordinary skill in the art. *In re Bell*, 991 F.2d 781, 783, 26 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1993). To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed invention and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. MPEP § 2142.

The independent claims each recite negating or “tuning out” parasitic or stray capacitances within a SAW resonator, allowing a series resonant circuit to be formed by the SAW resonator and a variable tuning capacitor coupled to a port of the SAW resonator. Such a feature is not shown or suggested in the cited reference, nor apparent to those skilled in the art. Any assertion within the Office Action that such a structure or process is well-known in the art is respectfully traversed.

Negating or tuning out stray capacitance at a selected frequency to allow a SAW resonator to form a series resonant circuit with an external capacitance is not taught or suggested in the relevant art. In general, as taught in U.S. Patent No. 6,239,664 and described in the specification, efforts to tune SAW resonators in order to achieve high Q filters have address parasitic capacitance within the SAW filters by suppressing the secondary responses introduced by such capacitances. Specification, page 3, line 19 through page 5, line 17.

Similarly, *Driscoll* fails to teach or suggest tuning out parasitic capacitances within a SAW resonator in order to permit formation of a series resonant circuit by a SAW resonator and an external (adjustable) capacitance. In fact, *Driscoll* teaches away from such a feature by indicating the “[f]inely tuning out the parasitic capacitances is not required . . .” *Driscoll*, column 5, line 41–41.

Therefore, the rejection of claims 1–10 and 12–20 under 35 U.S.C. § 103 has been overcome.

**AMENDMENTS WITH MARKINGS TO SHOW CHANGES MADE**

The paragraph on page 1 at lines 6–9 of the specification were amended herein as follows:

The present invention is related to the subject matter of commonly assigned, copending U.S. Patent Application No. 09/[\_\_\_\_\_] (Attorney Docket No. RFMI01-00214)]801,452, which is incorporated herein by reference.

The paragraphs bridging page 3, line 19 through page 5, line 17 of the specification were amended herein as follows:

One approach to increasing the tune range of an oscillator employing a SAW resonator is disclosed in U.S. Patent No. [\_\_\_\_\_] (Application Serial No. 09/263,136, Attorney Docket RFMI01-00194)]6,239,664. Within a relatively narrow frequency range, the SAW resonator has an equivalent circuit similar to that of a bulk crystal, as shown in FIGURE 4. Within that frequency range, the equivalent circuit 401 of the SAW resonator includes a series resonator comprising an inductance  $L_M$ , a capacitance  $C_M$  and a resistance  $R_M$  all connected in series, with a shunt capacitance  $C_O$  in parallel with the series resonator and

formed by the internal parasitic and package capacitance of the SAW resonator. To make the SAW resonator tunable, an inductor  $L_O$  sized to effectively tune out capacitance  $C_O$  is connected in parallel with the SAW resonator 401 and a variable tuning capacitance  $C_{TUNE}$ , such as a varactor diode, is connected in series with the SAW resonator 401. As the capacitance of tuning capacitance  $C_{TUNE}$  decreases, the center frequency for the passband of the single port resonator circuit 400 increases.

The frequency range across which the SAW resonator 401 has the equivalent circuit shown, while relatively small, is both larger than the passband of the SAW and large enough to provide the tuning capability required. The disadvantage of the single port SAW resonator circuit 400 is that the circuit 400 has one or more secondary responses 500, as shown in FIGURE 5, because the shunt inductor  $L_O$  resonates with the tuning capacitance  $C_{TUNE}$  at another frequency (other than the desired passband center frequency). Accordingly, U.S. Patent No. [ ]6,239,664 discloses (not shown in FIGURE 4) an additional inductance and capacitance in conjunction with an amplifier stage to effectively eliminate any secondary responses. Within the passband of the SAW resonator, the SAW resonator circuit 400 provides a low impedance path to ground for the amplifier, forming a Colpitts oscillator. However, the amplifier must present a

negative resistance which is greater than the resistance of the tuned SAW resonator circuit 400 in order for the circuit to oscillate.

Due to the additional tuning requirements necessary to tune out the secondary response(s), the SAW resonator oscillator disclosed in U.S. Patent No. [ ]6,239,664 is not easily manufactured reliably in quantity, and spurious responses are seen during manufacturing. Moreover, the structure is complex, with the tuning of the inductive coils and the values of capacitances, including the parasitic capacitances, being critical. Finally, the structure is large, requiring a dual in-line package for a practical implementation.

Claims 1, 5, 8 and 12 were amended herein as follows:

1           1. (amended) For use in an oscillator, a two port SAW resonator circuit for providing  
2 a tunable low phase noise oscillator signal comprising:

3                   a two port SAW resonator;

4                   at least one inductance coupled to a port of the SAW resonator, wherein the at  
5 least one inductance is connected and sized to approximately tune out a stray capacitance seen  
6 at the port within an equivalent circuit for the SAW resonator at a selected frequency; and

7                   at least one variable tuning capacitance coupled between the port of the SAW  
8 resonator and an input or output port for the SAW resonator circuit, wherein the at least one  
9 tuning capacitance forms a series resonance circuit with the SAW resonator and may be  
10 selectively employed to alter a resonant frequency of the SAW resonator circuit.

1           5. (amended) The SAW resonator circuit as set forth in Claim 1 wherein adjusting a  
2 capacitance of the at least one variable tuning capacitance alters the resonant frequency for the  
3 SAW resonator circuit by altering a total capacitance for [a]the series resonator circuit formed  
4 by a series resonator within the equivalent circuit for the SAW resonator and the at least one  
5 tuning capacitance.

1           8. (amended) An oscillator comprising:

2                   an amplifier; and

3                   a two port SAW resonator circuit connected in a series loop with the amplifier

4   for providing a tunable low phase noise oscillating signal comprising:

5                   a two port SAW resonator;

6                   at least one inductance coupled to a port of the SAW resonator, wherein

7   the at least one inductance is connected and sized to approximately tune out a stray

8   capacitance seen at the port within an equivalent circuit for the SAW resonator at a

9   selected frequency; and

10                  at least one variable tuning capacitance coupled between the port of the

11   SAW resonator and an input or output port for the SAW resonator circuit, wherein the

12   at least one tuning capacitance forms a series resonance circuit with the SAW resonator

13   and may be selectively employed to alter a resonant frequency of the SAW resonator

14   circuit.



1           12. (amended) The oscillator as set forth in Claim 8 wherein adjusting a capacitance of  
2   the at least one variable tuning capacitance alters the resonant frequency for the SAW resonator  
3   circuit by altering a total capacitance for [a]the series resonator circuit formed by a series  
4   resonator within the equivalent circuit for the SAW resonator and the at least one tuning  
5   capacitance.

SUMMARY

If any issues arise, or if the Examiner has any suggestions for expediting allowance of this Application, the Applicant respectfully invites the Examiner to contact the undersigned at the telephone number indicated below or at *wmunck@davismunck.com*.

The Commissioner is hereby authorized to charge any additional fees connected with this communication or credit any overpayment to Deposit Account No. 50-0208.

Respectfully submitted,

DAVIS MUNCK, P.C.

Date: \_\_\_\_\_

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